

at his desk. A type of single card reader has been devised in the United States. The card is placed in a base plate and a slotted bar is moved along the base over detents at each of the 80 possible column positions; its position may be read by various markings on the edge of the base.

In each of the positions the card is explored for holes by running a pin along the slot; when a hole is located its position is indicated by marks along the slot.

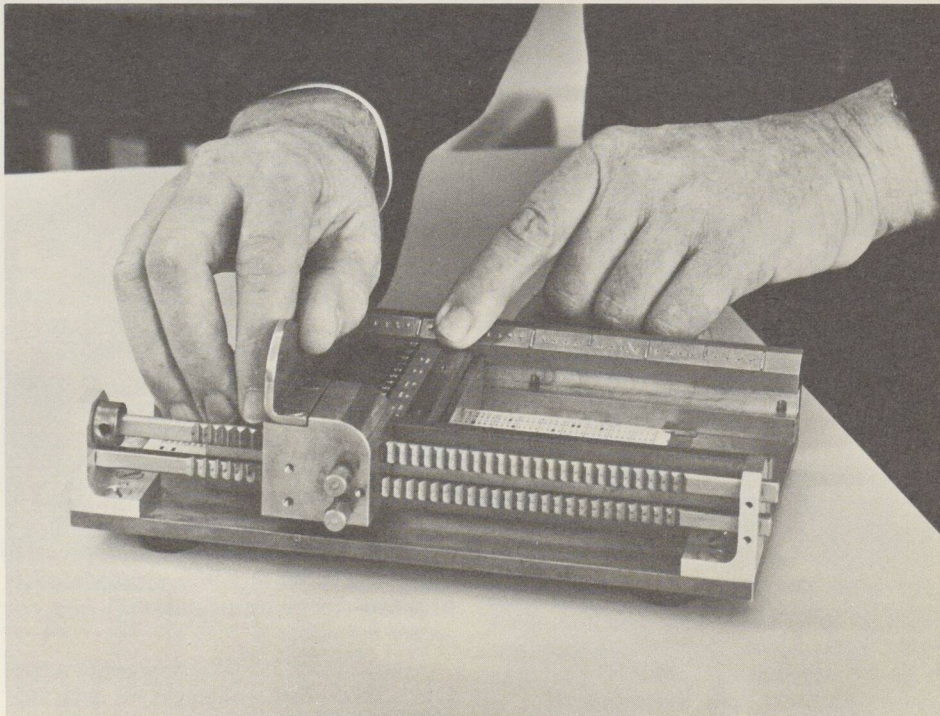
Although this method is quite successful when the locations are known and merely being confirmed, it is extremely tedious when each of the 960 possible hole locations must be explored, and takes several minutes.

To assist blind programmers in their work, James Swail, 42, a blind electronics expert with the National Research Council of Canada, has devised a manually-operated reader for IBM punched cards.

With this device, the card is held in a base plate and a carriage is moved manually along a track attached to the base. The edge of the plate carries a raised scale calibrated in Braille numbers from 0 to 80 to indicate the carriage's position in relation to the card. The carriage has a row of 12 pins which are normally flush with its top surface and a second Braille scale indicates the pin number.

On the under side of this carriage is a corresponding row of 12 rollers which are connected to opposite ends of pivoted arms. The other ends of these arms drive the pins. The rollers are held against the surface of the card by spring tension and, due to the reversal action of the pivoted arms, the pins are caused to rise from their flush positions when the appropriate roller drops into a hole in the card.

Thus, when scanning a card for holes, the finger is held lightly against the surface of the carriage while it is moved along the length of the card. When a hole is found the appropriate pin rises, the carriage is stopped, and a reading of the location is taken from both raised scales. With this device a



*Blind programmer using the new reader to scan a punched card in a matter of seconds.*

*Grâce au nouveau lecteur, un programmeur aveugle peut "lire" une carte perforée en quelques secondes.*

card may be scanned in a matter of a few seconds.

Mr. Swail took two years to design and build his reader. For the last few months he has been evaluating its operation in the hands of an upper-level blind computer programmer.

"Once we have determined the machine's limits and obtained a clearer idea of its need, I expect the next step will be to convert it from manual to electronic operation," Mr. Swail says.

This is the latest in a series of inventions to aid the blind that have originated with Mr. Swail — blind since early childhood. A Bachelor of Science graduate from McGill University, Mr. Swail joined the Navigational Aids Section of NRC's Radio and Electrical Engineering Division in 1946. At first, he worked on special electronic instruments to help him conduct his own research; then, in 1951, he joined the Division's Instruments Section. Since that

time, a score of vocational aids for the blind have been produced by his laboratory. These aids have done much to increase the employment opportunities of the blind in industry and commerce.

One such aid is a photoelectric sensor designed to assist a blind person to detect the presence of print on a page, to locate light sources and to perform many similar tasks.

This device whines in response to light. A blind switchboard operator could check a board in use to determine which lights are operating or which are flashing. It can also be used to tell whether a piece of paper is clean or has writing on it.

"You can use it to check whether your typewriter ribbon is inking. It's tiresome to address a whole lot of envelopes and get them all back because the typewriter failed to ink," Mr. Swail says.